# Corporate Social Responsibility and the Open Society

**Citation for published version:**
Rees, W & Mackenzie, C 2011 'Corporate Social Responsibility and the Open Society'.
https://doi.org/10.2139/ssrn.1966030

**Digital Object Identifier (DOI):**
http://dx.doi.org/10.2139/ssrn.1966030

# Dividend Irrelevance and Accounting Models of Value

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# Dividend Irrelevance and Accounting Models of Value


## Abstract

In accounting models of value dividends typically appear to have a positive impact on value despite theoretical reasons to expect dividend displacement. We show that this result is driven by the relationship between dividends and non-transitory "core" earnings. Dividend displacement can no longer be rejected if the sample is restricted to cases where core earnings can be effectively modelled. Under these circumstances we are also unable to reject pricing equality between dividends and other capital changes. Not only does this result provides an explanation for the anomalous positive pricing of dividends in previous studies but the sensitivity to model specification also suggests caution should be exercised when using valuation models to test the impact of firm characteristics or accounting practices.



**Keywords:** dividend displacement, core earnings, valuation models, value relevance tests

**Dividend Irrelevance and Accounting Models of Value**

## 1. Introduction

We revisit a problem that has been puzzling researchers for some time: why do dividends appear to have a strong positive impact on value in accounting based models (e.g. Rees, 1997; Fama and French, 1998; Giner and Rees, 1999; Akbar and Stark 2003; and Hand and Landsman, 2005) when Miller and Modigliani's (1961) dividend irrelevance theory would have us expect dividend displacement - a one for one negative impact of paying out dividends on value? There are two possible, not necessarily mutually exclusive, explanations. Firstly, paying dividends does have a positive impact on value, at least in certain circumstances. Secondly, the results in the papers referred to above are misleading in that they overstate the impact on value of paying dividends.

According to the original Miller and Modigliani (1961, hereafter M&M) hypothesis dividend policy should not impact on value unless it implies changes in a firm's value creating investments or operational decisions[1]. If a firm pays out one unit of currency to its shareholders, it loses value by one unit, unless there is a further impact of that transaction on operational or investment

[1] This has recently become open to debate and DeAngelo and DeAngelo (2006), Handley (2008) and Clubb and Walker (2009) have reviewed the applicability of the original M&M hypothesis. The critiques have validity in that they identify circumstances where M&M may not hold and, in the case of Clubb and Walker (2009), they specify some possible implications for accounting based valuation models. However, these require a relaxation of the M&M restrictions.

decisions. M&M exclude such further impacts on value by carefully defining their model. Possible violations of the M&M assumptions suggest circumstances in which we might find that their model does not hold and where we might find a positive or negative valuation effect of dividends. There are at least four capital market imperfections where dividend payouts may impact value (Dhanani, 2005): i) constraints regarding capital structure and sources of financing ii) information asymmetries and signalling iii) agency problems and iv) investor economic characteristics, such as the tax status, as reflected through different ownership structures. Thus, we might look for a value impact of dividend payment where these restrictions do not apply: where we have inefficient capital markets, governance issues, agency problems, information asymmetry and signalling, and differential tax treatment and uncertainty. This wide list of exemptions suggests that dividend value relevance could be quite common.

The second explanation for a positive impact of dividend payments is that existing models of value may overstate the impact or even suggest a positive impact when none exists. We might expect this to happen under a number of different scenarios. Firstly, if we fail to effectively model expectations about future cash flows, and dividends are correlated with those expectations, dividends could appear to positively affect value when they are only acting as an effective proxy for these expectations (Rees, 1997; Fama and French, 1998; Giner and Rees, 1999). Secondly, if our underlying model is not linear but we impose linearity on the data, the significance of any of the variables, including dividends, might be misrepresented. Thirdly, Pope and Wang (2005) point out that if components of earnings have different time-series characteristics, they should have different value relevance. If dividends are correlated with components of earnings that have high value relevance, and if we do not model those components explicitly, dividends may appear to be value relevant. Fourthly, Pope and Wang (2005) also argue that dividends will attract a more positive coefficient where accounting is conservative than where accounting is unbiased. Finally, Barth and Clinch (2009) show that if we fail to control for size effects, any size related variable, such as dividends, may attract a more positive coefficient than it would otherwise.

We first estimate a simple valuation model where market capitalisation is a function of book value of equity, net income, dividends, other capital contributions, research and development expenditure and, in certain specifications, other information represented by valuation errors in the prior year. The model is consistent with Ohlson (1995), Akbar and Stark (2003) and Pope and Wang (2005), and with a substantial set of empirical papers discussed in detail later[2]. We estimate the model using a sample of British quoted firms over the period 1992 to 2008.

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[2] By consistent we mean that the model we estimate can be reconciled with that which would be estimated if we were to try and model these various papers. In some instances additional assumptions or restrictions are made, such as splitting dividends between ordinary dividends and other contributions or choosing not to split earnings into earnings before R&D and R&D.

A graphical analysis of our sample reveals significant non-linearities in the relationship between our dependent variable (market-to-book) and both earnings and dividends scaled by book value (see Figure 1). Firstly, despite a typically positive relationship between dividends and value, firms paying no dividends appear to be more valuable than firms paying small dividends. We assume that some firms with high growth potential refrain from paying dividends to retain funds for investment and that these valuable non-payers are mixed with other firms that are struggling financially. Secondly, we observe that value is usually positively related to profitability and yet this relationship is flat for the loss making firms that occupy the three lower deciles. One feasible explanation is that losses are more transitory than profits (e.g., Das and Lev, 1994; Freeman and Tse, 1992) and therefore have a limited impact on value.

< FIGURE 1 ABOUT HERE >

An estimate of the relationship between value and either dividends or earnings would result in a lower slope coefficient if estimated on the full sample than if estimated using only cases with positive explanatory variables: in univariate models the dividend coefficient increases from 12.18 to 22.28 if restricted to dividend payers and the coefficient on net income increases from 0.10 to 13.97 if restricted to profitable firms. We therefore examine the impact of estimating our model with and without loss making firms and firms that do not pay dividends. Our results move significantly towards dividend displacement when we restrict the sample to profitable dividend payers. Many of the excluded firms re-enter our sample (i.e., when a loss is reversed or they (re-)start paying dividends). Estimates based a sample restricted to these firms when they first rejoin the sample confirm that they behave as do other firms. This implies that the variation in results is driven by the misspecification of the model not to the types of firms excluded. As loss-making firms and those not paying dividends are not susceptible to analysis using valuation models, we argue that the danger does not lie in excluding these cases from the analysis, but in leaving them in and in drawing misleading inferences. This result is robust to the inclusion or omission of other information as defined by Akbar and Stark (2003) although the other information variable is robustly positive and statistically significant.

Our model is then extended to include either of two alternative proxies for the core component of earnings. We view "core" earnings as the base from which investors would predict future earnings and define it as expected earnings for a particular firm under its current strategic position but excluding the impact of abnormal or unexpected events. This is first estimated as that part of current earnings in our sample that is correlated with current analysts' forecasts of next year's earnings. The second approach defines core earnings as that part of earnings which is correlated with the pervious years expectations and analysts' definition of base level earnings for the year in question. When either measure of core earnings is included the coefficient is positive and significant and the coefficient on dividends is much reduced. Whenever the sample is restricted to profitable dividend payers, or where the estimate of other information is included, the dividend coefficient is insignificantly different from zero. In both cases where an estimated core earnings is included together with other information we are unable to reject dividend or other capital displacement. We investigate the sensitivity of our model to different estimation techniques, using different independent variables, across different sub-samples, where we might expect the influence of dividends to vary, and a different valuation model (Fama and French, 1998). Across all these additional tests we conclude that as long as core earnings can be effectively modelled dividend displacement cannot be rejected.

This leads us to investigate the role that dividends play as a surrogate for core income. In models with core earnings as the dependent variable, where the sample includes unprofitable firms, the coefficient on dividends is highly positive and significant. If unprofitable firms are excluded or other information included the coefficient on dividends declines by a significant amount but remains positive and statistically significant. This is consistent with dividends acting as a surrogate for core earnings as was explicitly suggested by Rees (1997) and implied by Fama and French (1998). However, our final analysis of future earnings shows that dividends show a positive correlation with future earnings only when loss-making firms are included in the sample. Unlike models of core earnings when loss-making firms are excluded dividends are ineffective in predicting future earnings.

In the following section we review previous studies that have modelled the impact of dividends on firm value and in section 3 we explain our research approach. Section 4 reports our results and we conclude in section 5.

## 2. Dividends and value

Accounting researchers in accounting models of value is typically based on the seminal Ohlson (1995) paper:

$$\mathbf{mv_t = (1\text{-}k)bv_t + k(\varphi ni_t - (d_t + oc_t)) + \alpha \nu_t}$$

where $\mathbf{mv_t}$, $\mathbf{bv_t}$, $\mathbf{ni_t}$, $\mathbf{d_t}$, $\mathbf{oc_t}$ and $\boldsymbol{\nu}_t$ are respectively defined as market value, book value of equity, net income, dividends, other net capital transactions and other information. $\mathbf{k}$, $\boldsymbol{\varphi}$ and $\boldsymbol{\alpha}$ are parameters which vary with the cost of capital and the autocorrelation of both abnormal earnings and other information[3].

For example, Hand and Landsman (2005) estimate:

$$\mathbf{mv_{it} = a_0 + a_1bv_{it} + a_2ni_{it} + a_3d_{it} + a_4oc_{it} + e_{it}}$$

without variables representing other information and:

$$\mathbf{mv_{it} = b_0 + b_1bv_{it} + b_2ni_{it} + b_3d_{it} + b_4oc_{it} + b_5\nu_{it} + b_6fni_{it} + e_{it}}$$

[3] $\varphi$ is $R/(R\text{-}1)$, $k$ is $(R\text{-}1)\cdot\omega/(R\text{-}\omega)$ and $\alpha$ is $R/(R\text{-}\omega)\cdot(R\text{-}\gamma)$ and $R$ is 1 plus the cost of capital, $\omega$ the autocorrelation coefficient on abnormal earnings and $\gamma$ the autocorrelation coefficient on other information.

incorporating $\mathbf{v_t}$**,** the portion of analysts forecasts not predicted by an autoregressive model of earnings, and $\mathbf{fni_{t+1}}$, analysts' forecast of one-year ahead earnings, to represent two alternative formulations of other information. Hand and Landsman (2005) estimate this model at the firm level – i.e. undeflated. This last model splits Ohlson's dividends variable into two components, dividends and other capital transactions, and incorporates two indicators of Ohlson's other information. $\mathbf{v_t}$ and $\mathbf{fni_t}$, but is otherwise a direct empirical analogy of Ohslon's theoretical model of value. Other papers, such as Akbar and Stark (2003) and Pope and Wang (2005), have proposed models that are not explicitly founded on Ohlson's model but lead to similar empirical models with some differences. These include variation in the way other information is modelled, if at all, choices regarding the inclusion or not of other capital changes and whether to split this into repurchases and new share issues, and variation in the specification of earnings, particularly whether to identify research and development expenditure separately or not.

Hand and Landsman (2005) clarify that the impact on value of paying dividends in their model is the coefficient on dividends minus the coefficient on the book value of equity ($\mathbf{a_3 - a_1}$ in their model above), but only where next year's income is not included in the model. They argue that where next year's earnings expectation is included the test for dividend displacement should be $\mathbf{b_3 - b_1 - r \cdot b_6}$ where $\mathbf{r}$ is the cost of equity and $\mathbf{b_6}$ the coefficient on $\mathbf{fni_{t+1}}$**,** the forecast of next year's net income. This approach assumes clean surplus earnings but where this does not apply the test suggested by Hand and Landsman (2005) would be an approximation[4].

Despite the differences in models, estimation techniques and test statistics, the evidence from earlier studies is broadly consistent. Using a pooled cross-section and time-series for 1987-1995 for UK firms, and without measures to model other information, Rees (1997) estimated significant coefficients on dividends in the range 10-13 (after adjusting for the coefficient of distributed earnings). Despite varying model specification, similar results are found by Hand and Landsman (2005) for US firms, Giner and Rees (1999) for Spanish firms and Akbar and Stark (2003), Poletti Hughes (2008), Dedman et al. (2009), Gregoriou (2010) and Dedman et al. (2010) for British firms. In all cases the core results reveal coefficients on dividends that are significant and positive and inconsistent with dividend displacement. In addition the evidence shows that where research and development expenditure is separated from other income it is robustly positive and significant (Green et al. 1996; Akbar and Stark 2003; Franzen and Radhakrisnan 2009; Dedman et al. 2010; Shah et al. 2009); where dividends are separated from other (net) capital contributions the dividend coefficient increases and the other capital contributions coefficient falls but may remain significantly positive (Lo and Lys, 2000; Akbar and Stark, 2003; Shah et al., 2009; Oswald 2008; Dedman et al. 2010; Hand and Landsman, 2005); and where

[4] We are grateful to an anonymous reviewer for pointing this out.

measures representing other information are introduced, although computed in various ways, they tend to be statistically significant and can impact on the estimates for other variables' coefficients (Akbar and Stark 2003; Hand and Landsman 2005; and Dedman et al., 2009). Other findings include evidence that advertising expenditure (Shah et al., 2009), capital expenditure (Rees, 1997; Dedman, 2009; and Dedman et al., 2010), international diversification (Garrod and Rees 1998) and leverage, measured as either debt (Rees 1997) or interest payments (Fama and French 1998), can significantly impact on value.

However, Lo and Lys (2000) present evidence that suggests the results referred to above may have been driven by their choice of scaling variable. For example Rees (1997) deflates the model by number of shares in issue, Fama and French (1998) by the book value of total assets and Hand and Landsman (2005) use firm level, i.e. unscaled, variables. The Lo and Lys (2000) results suggest that the coefficients on dividends and on other capital contributions are sensitive to choices about scaling. Where the model is scaled by opening market value (or if a size related control variable is included) coefficients on dividends and other capital contributions are negative whereas both are positive if the model is estimated at the firm level (as in Hand and Landsman 2005) and dividends are positive if deflated by the number of shares (as in Rees, 1997). The Lo and Lys (2000) results are consistent with Goncharov and Veenman's (2010) more recent evidence from the US. However, Akbar and Stark (2003), Dedman et al. (2009) and

Shen and Stark (2011) revisit the problem using British data and find that coefficients on dividends are reliably positive whether the model is estimated at the firm or per share level or deflated by book or opening book value. They also find that coefficients on other capital contributions are reliably negative. Akbar and Stark conclude that "*deflators have no impact on results relating to the relationship between dividends and market value in the UK*" (2003 p1224). Rees (2005) also reviews the impact of deflators when discussing Hand and Landsman's (2005) work. He concluded that their approach produced robust results, but results that are dominated by large firms and insensitive to the many small firms that may provide insight into different determinants of dividend valuation. More recently Barth and Clinch (2009) have demonstrated that valuation models can be sensitive to the choice of deflator but both number of shares (despite the lack of any theoretical justification) and closing book value of equity tend to provide reliable results and Shen and Stark comment that current book value is "*the strongest overall performer*" as the deflator (2011 p3).

Hand and Landsman (2005) present results that cast further light on the role of dividends in valuation. They show that dividends are positively valued unless the model incorporates analysts' forecasts and forecast error. They suggest that their results are evidence of mispricing. Their results might also be more simply interpreted as confirming that dividends provide information on future earnings that is not available in a model that simply incorporates earnings and book value of equity variables. Dividends remain influential when earnings forecasts are incorporated, presumably because the forecasts are flawed and dividends provide information concerning the forecast error. These results do not rule out the possibility that dividends provide evidence on other valuation-relevant parameters, such as earnings beyond $t$+1.

With regards to earnings predictability Skinner (2009) investigated the information contained in dividends regarding earnings quality. His results show that dividend paying firms have more persistent earnings and that this is particularly so for firms with larger dividend payouts, for large firms, and for large firms with larger payouts. The effect is not restricted to loss making firms although it is stronger for that sub-sample. Skinner (2009) interprets his results as being entirely consistent with dividends signalling quality earnings, but he does not present direct evidence of the valuation impact of dividends.

The research evidence to date clearly shows that accounting valuation models typically find a highly significant and strong positive relationship between dividends and value. This could be explained as dividends helping analysts and investors to predict earnings and value companies, or it could be explained by assuming the market is inefficient with respect to dividends. It could also be driven by model misspecification.

## 3. Research Method

### 3.1 Modelling market value.

Following Akbar and Stark (2003) we use a straightforward and generalisable valuation model where market value $\mathbf{mv}_t$ is assumed to be a function of a vector $\mathbf{z}_t$ of value relevant accounting variables. Akbar and Stark specify $\mathbf{z}_t$ as book value $\mathbf{bv}_t$, earnings, $\mathbf{ni}_t$, research and development expenditure $\mathbf{rd}_t$, dividends $\mathbf{d}_t$ and other capital contributions $\mathbf{oc}_t$, all measured at time t[5]. Then if ***i*** follows a stochastic time series process

$$\mathbf{z}_t = \boldsymbol{\Omega}\mathbf{z}_{t-1} + \boldsymbol{\varepsilon}_t$$

market value may be estimated as

$$\mathbf{mv}_{it} = \alpha_0\mathbf{bv}_{it} + \alpha_1\mathbf{ni}_{it} + \alpha_2\mathbf{rd}_{it} + \alpha_3\mathbf{d}_{it} + \alpha_4\mathbf{oc}_{it} + \mathbf{e}_{it} \qquad \text{(Equation 1)}$$

The Akbar and Stark (2003) model makes no predictions regarding the value of coefficients in Equation 1 but dividend and capital contribution displacement implies

$$-\alpha_0 + \alpha_3 = -1$$

$$-\alpha_0 + \alpha_4 = -1$$

and hence

$$\alpha_3 - \alpha_4 = 0$$

[5] As we partition earnings into various segments it is convenient to maintain one definition of earnings as earnings after interest and tax, so in our model the impact on value of R&D expenditure is $a_1$ plus $a_3$ rather than $a_3$ as in Akbar and Stark (2003). We also segment net income into transient and core income and include the variable $cni_t$ to identify our estimate of core income. The value impact of core income would be $a_1$ plus $a_2$ in Equation 1.

The third constraint above is not a direct test of displacement but previous studies have generated more reliable estimates of the value impact of non-dividend capital contributions than for dividends. We therefore use this relatively robust estimate of the impact of capital changes as a benchmark for the dividend impact. Dedman et al. (2010) show that the impact of dividends can be very different from that of other capital changes but that capital contributions, special dividends and share repurchases, which collectively make up our other capital measure, all have similar impact on value.

Hand and Landsman (2005) develop an estimate of other information based on Ohlson (2001) that is designed to capture information about future abnormal income not contained in the time-series of abnormal earnings. However, we follow Akbar and Stark (2003) who incorporate a measure of other information **oi** that can be seen as reflecting all value-relevant other information. They develop an internally generated estimate of other information derived from the valuation error at time *t*-1 where **oi** is defined as

$$\mathbf{oi_{it} = [mv_{it-1} - (\hat{a}_0 bv_{it-1} + \hat{a}_1 ni_{it-1} + \hat{a}_3 rd_{it-1} + \hat{a}_4 d_{it-1} + \hat{a}_5 oc_{it-1})] bv_{it-1} / bv_{it}}$$

Other information is the valuation error in the previous year calculated by applying the slope coefficients $\mathbf{a_0}$ to $\mathbf{a_6}$ estimated using the previous year's observations and the final two terms rescale the estimated value by the current book value.

With the inclusion of our estimate of other information the valuation model then becomes[6]

$$\mathbf{mv_{it} = \beta_0 bv_{it} + \beta_1 ni_{it} + \beta_2 rd_{it} + \beta_3 d_{it} + \beta_4 oc_{it} + \beta_5 oi_{it} + e_{it}} \qquad \text{(Equation 2)}$$

We define core net income in two ways but as both incorporate data from analysts' forecasts these can only be calculated for cases where analysts' forecasts are available. Firstly, we estimate that element of current income that can be used as a basis for forecasting future income. We therefore estimate core net income as

$$\mathbf{cni^f_{it} = b_0 + b_1 fni_{it}}$$

where $\mathbf{fni}_{t+1}$ is the expectation (analysts' mean forecast) at time t of net income at t+1 and the slope coefficients are estimated from a regression of this year's net income **ni** on the current forecast of next year's net income $\mathbf{fni_{it}}$. We term this estimate of core net income as the "forward" estimate of **cni**.[7]

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[6] Equation 1 above is consistent with Ohlson (1995) if we assume: i) that the accounting variables are sufficient to effectively model market value and hence there is no role for "other information" and ii) that partitioning total capital contributions into dividends and other capital contributions and partitioning net income into research and development, transitory and core net income has no theoretical impact. Apart from the segmentation of income, Equation 1 is consistent with Hand and Landsman's (2005) Equation 7, which is explicitly derived from Ohlson (1995). It is also consistent with Akbar and Stark's (2003) Equation 3, which segments earnings between research and development and other income but does not separately identify core earnings, and Pope and Wang's (2005) Equation 3, which deals with unspecified earnings segments with different persistence.

[7] Regarding the terminology used to denote the two estimates of of *cni* we stress that the measurement is 6 months after the balance-sheet date. Hence, all data necessary to compute either estimate of *cni* is known at the time of measurement and there is no forward-looking bias in this research design (see section 3.3. below for details).

Including $\mathbf{cni}^f$ will impact on the slope coefficients in equation 2 to the extent that it is correlated with those variables and will also improve the statistical power of the model to the extent that its inclusion improves the explanatory power of the equation.

However, as $\mathbf{fni}_{it}$ is determined after the end of the financial year it could be argued that dividends could impact on forecasts and hence on our estimate of core earnings. This could serve to understate the true impact of dividends on value. Consequently, the second model avoids expectations regarding events falling after the balance sheet date and models core earnings as

$$\mathbf{cni}^l_{it} = \mathbf{c}_0 + \mathbf{c}_1\mathbf{fy0}_{it} + \mathbf{c}_2\mathbf{fni}_{it-1}$$

where $\mathbf{fy0}_{it}$ is the IBES definition of base (FY0) earnings at time t and $\mathbf{fni}_{t-1}$ is the expectation (analysts' mean forecast) at time t-1 of net income at t and the slope coefficients are estimated from a regression of this year's net income $\mathbf{ni}_{it}$ on the prior forecast of this year's net income $\mathbf{fni}_{it-1}$ combined with the definition of this year's base earnings $\mathbf{fy0}_{it}$. We term this estimate of core net income "lagged" estimate of **cni**.

We estimate Equations 1 and 2 with and without the **cni** variable as the impact of the introduction of a core income estimate is instructive:

$$\mathbf{mv}_{it} = \gamma_0\mathbf{bv}_{it} + \gamma_1\mathbf{ni}_{it} + \gamma_2\mathbf{rd}_{it} + \gamma_3\mathbf{d}_{it} + \gamma_4\mathbf{oc}_{it} + \gamma_5\mathbf{oi}_{it} + \gamma_6\mathbf{cni}_{it} + \mathbf{e}_{it} \qquad \text{(Equation 3)}$$

We view core net income as a segmentation of earnings into core and transitory components consistent with Pope and Wang (2005) equation 4. Although we use information from outside the sequence of accounting numbers to estimate core earnings we view the "other information" in the Ohlson (1995) sense as information concerning future abnormal earnings not reflected in the accounting variables modelled. Thus our estimate of other information is derived using data from the period before the net income realisation.

### 3.2 Modelling core and future earnings.

We hypothesise that dividends play an important role in the valuation model because, in part at least, dividends are correlated with a) core earnings and hence b) future values of earnings. The core earnings estimation model we use simply identifies that portion of current earnings which is best able to explain analysts' forecasts of next year's earnings collected six months after the accounting year end (and hence contemporaneous with the market value of equity). Thus it is the predicted value from a pooled regression of year $t$ net income on the forecast of year $t$+1 net income.[8] However, in a model of value, where value is in part driven by expectations, modelling core earnings as a function of analysts' expectations appears to be an effective starting point. In

[8] An alternative procedure would be to estimate a cross-sectional regression using $t$-1 data, recover the estimated coefficients and use these together with time $t$ data to obtain predictions of $cni_t$. In preliminary analyses we found little benefit of using this procedure over using the coefficients from the pooled estimate.

Equation 4 we identify the link between our estimate of core earnings and the other components in the valuation model. It is apparent that this estimation is in part redundant as the coefficients in equation here can be calculated from the impact of introducing core earnings into the valuation models[9]. However, estimating the relationship directly is convenient and identifies the statistical significance of the coefficients and with it the correlation of the components of the valuation model with core earnings:

$$\mathbf{cni_{it} = \delta_0 bv_{it} + \delta_1 ni_{it} + \delta_2 rd_{it} + \delta_3 d_{it} + \delta_4 oc_{it} + \delta_5 oi_{it} + e_{it}} \qquad \text{(Equation 4)}$$

In Equation 5 we examine the relationship between the value-relevant variables tested in Equations 1 to 3 and next years' income:

$$\mathbf{ni_{it+1} = \phi_0 bv_{it} + \phi_1 ni_{it} + \phi_2 rd_{it} + \phi_3 d_{it} + \phi_4 oc_{it} + \phi_5 oi_{it} + \phi_6 cni_{it} + e_{it}} \qquad \text{(Equation 5)}$$

The expectation is that dividends will be a) positive and significant in a model of core earnings (equation 4) but the slope coefficient on dividends will be significantly lower where firms with negative earnings are excluded and b) positive and significant in a model of future net income

[9] For example the coefficient on dividends in the model of core earnings (column 1 table 5) is 0.671, which multiplied by the coefficient on core earnings of 10.61 (column 5 table 3) gives 7.119. If this is added to the residual coefficient on dividends of 5.479 (column 5 table 3) it provides the original coefficient on dividends of 12.588 as estimated in the model excluding the core income variable (column 3 table 3).

(equation 5) but significantly lower when firms with negative net income are excluded and where the estimate of core net income is included.

### 3.3 Data

The full sample results (after deletion of 4,037 cases with missing values, 1,533 with accounting periods more than 3 months longer or shorter than one year and 5,333 cases with outliers) are based on 18,045 cases drawn from UK industrial and commercial quoted companies during the period 1992 to 2008. The sample is restricted to 14,229 cases where we require estimates of other information, **oi***,* to 11,573 where we require estimates of core net income, **cni***,* and to 8,533 where both are needed. For some tests we often restrict our sample to cases with positive net income and positive dividends, which limits the original sample to 10,417, the other information sample to 8,827, the core net income sample to 8,193 and the fully restricted sample to 6,525. Wherever we have limited the sample due to the inclusion of a variable with limited availability we have contrasted the results for the unrestricted and restricted samples, omitting the new variable to improve comparability, and find the results to be generally robust to sample restrictions.

< TABLE 1 ABOUT HERE >

The data is collected from Thomson Financial Datastream and the accounting numbers originate from Worldscope whereas the forecast numbers are from I/B/E/S. $\mathbf{ni}_t$ is net income, $\mathbf{rd}_t$ is research and development expenditure, $\mathbf{d}_t$ is ordinary dividends[10] and $\mathbf{oc}_t$ is other capital changes such as issues or repurchases. We estimate core net income, $\mathbf{cni}_t$, using analysts' consensus (mean) forecast for the financial year t+1 taken at 6 months after the financial year-end t. We have found that this delay is necessary to ensure that analysts' forecast data is appropriately specified. (There would otherwise be a large number of stale forecasts; this is also confirmed by manual inspection of the data). Moreover, British firms had up to 6 months after the financial year end to publish accounting data (Stark and Thomas, 1998), so it is reasonable to wait until we are satisfied that all information is impounded in securities' prices. Consequently, the market value of equity, $\mathbf{mv}_t$ is also taken at 6 months after the financial year-end. We also estimate other information $\mathbf{oi}_t$ as the valuation error from a cross-sectional valuation model estimated at t-1. All variables are deflated by current book value of equity.

As we have curtailed the sample for some of our tests, we have presented extensive descriptive statistics to demonstrate that our final samples are similar to the full sample in their important characteristics. It can be seen from Table 2 that, despite outlier deletion, some quite large values

[10] IFRS became mandatory for all listed companies in the EU for annual periods beginning on or after 1st January 2005. This changed the way firms account differently for dividends paid. Under SSAP 17, dividends were accounted for as an adjusting post balance sheet event in the period to which they related. Under IFRS it is prohibited to recognise dividends declared after the end of reporting period as a liability in that same reporting period (IAS 10 - Events after the reporting period). Instead, such dividends are disclosed in the notes but accounted for in the period in which they are paid. Typically, the number reported for year *t* will include final two interim dividends for year *t*-1 and two interim dividends for year *t* (while the other two dividends for year *t* will be included in the figure reported for *t*+1). Partial analyses show that the results are not sensitive to this issue.

remain in the sample even though they may represent economically valid values. To counteract any misleading influence of outliers we have tested the sensitivity of our results using quantile regression, which is less influenced by extreme values, and report both Pearson product moment and Spearman rank correlations between the variables of interest. Relatively high (more than 0.200) positive Pearson correlations are observed between market value (**$mv_t$**) and dividends (**$d_t$**), research and development (**$rd_t$**), other information (**$mv_t$**) and, negatively, other capital contributions (**$oi_t$**) for the full sample. When rank correlations are used the correlation on dividends increases but the previously negligible coefficient on net income becomes strongly positive. This might be expected given the non-linearities between value and both dividends and profits demonstrated in Figure 1. A broadly similar pattern is observed when the sample is restricted to profitable dividend-paying firms except that net income is strongly positively related to value for both Pearson and Spearman correlations.

In the second panel we see a very similar pattern augmented by the inclusion of the core net income variable (**$cni_t$**), which is strongly correlated with value for both samples and for both correlation methods. The net income variable is also correlated positively with value in all four estimates whereas in the former panel the Person correlation for the full sample was weak.

< TABLE 2 ABOUT HERE >

## 4. Results

### 4.1 Tests of Displacement for Dividends and Other Capital Changes

Our initial results are presented in Table 3. These valuation models are based on the full sample in column one, restricted to profitable dividend-paying firms in column two, all firms with IBES data available in columns three and IBES firms with positive net income and dividends in column four. Columns five to eight replicate those samples with the additional restriction that an estimate of other information is also required. All models include book value of equity (the intercept)[11], net income, research and development, dividends and other capital changes. For each regression we test whether the coefficient on dividends less that on book value is significantly different from -1, whether the coefficient on other capital changes less that on book value is significantly different from -1 and whether the coefficient on dividends is significantly different from that on other capital changes.

<TABLE 3 ABOUT HERE>

The coefficients estimated for the test variables ($\mathbf{bv_t}$, $\mathbf{d_t}$, $\mathbf{oc_t}$) are broadly in agreement with our expectations based on existing research. In columns one and three dividends attract coefficients of 14.43 and 13.25, which are too large to be reasonably explained by any of the theories put forward for dividend relevance, whilst the other capital changes show significant negative

[11] The first term in the models in equations 1 and 2 reduces to a constant after deflation with current book value $bv_t$. However, we also re-estimate all models with an aritfical constant (the inverse of the current book value). Similar to Garrod and Valentincic (2005) we find that most of these estimates are staticstically insignificantly different from zero, indicating that omitted variables do not systematically affect our inferences.

coefficients of -2.328 and -2.712. For both dividends and other capital changes we reject dividend displacement. The net income coefficients, 0.228 and 2.349, are low and this may be driven by the large number of cases with negative earnings. The full sample, column one, has both a higher dispersion of net income and a greater proportion of negative earnings number than the IBES sample in column three (standard deviation of $\mathbf{ni}_t$ is 0.397 vs. 0.229 in the IBES sample, and 29.7% of losses vs. 16.2% in the IBES sample). This would lead us to anticipate the lower $\mathbf{ni}_t$ coefficient we observe for the full sample. The research and development coefficients are reliably positive at 7.581 and 8.213 and this is consistent with previous evidence.

In the second and fourth columns we exclude cases with negative earnings or zero dividends. The dividend coefficients decline to 5.49 and 5.83, whilst those on net income increase to 13.17 and 12.56 compared to the unrestricted sample. The coefficients on other capital changes are now -1.44 and -1.78. Whilst these results are more in line with those that might be expected given the underlying residual income valuation model, the dividend coefficient remains significantly different from that on other capital changes and significantly different from that implied by dividend displacement. We still reject dividend displacement for other capital changes in the model in column four but not in the model in column two. The coefficients on research and development remain significantly positive. Thus the restriction of the experimental setting to cases that include only profitable and dividend paying firms produces results that are closer to those that would be expected were net income a good proxy for core income.

In models 5 to 8 we include the estimate of other income and repeat the tests from the first four models. The other information coefficient is always positive and statistically significant. The estimated slope coefficients on the net income, research and development and other capital contributions variables are broadly consistent with the results from the earlier tests. The coefficient on dividends and other capital contributions are less positive or more negative and the dividend coefficient is insignificantly different from zero in both cases where the sample is restricted to profitable dividend papers. However, in both cases we still reject dividend displacement. Thus, other information is statistically significant and substantially reduces the impact of the dividend variables but the results still imply that we should reject dividend displacement.

Overall the results presented in Table 3 confirm that a valuation model which fails to effectively model long-run profitability, either because the sample includes cases with negative current net income or the model fails to identify core earnings effectively, will attach a strong positive coefficient to dividends and the model appears to reject the dividend displacement hypothesis.

In Table 4 we investigate the impact of including estimates of "core earnings". In models one, two, five and six core earnings is estimated using forward looking forecasts. In the other four models we use prior forecasts of this years earnings and the IBES base earnings to model core earnings. In all models core net income, research and development and other information are significantly positive and net income is positive in all models and significantly so in all cases save model one. Where the sample includes loss-making firms and firms not paying dividends the results are inconsistent with dividends or other capital displacement – except for the one instance in model five where dividend displacement is not rejected. Where the sample is restricted to profitable dividend payers dividend and other capital displacement cannot be rejected except for model four where we still reject dividend displacement. Models six and eight include an estimate of other information, an estimate of core earnings and are restricted to our preferred sample. In both cases the results are consistent with dividend and other capital displacement and there is no statistically significant difference between the coefficients on dividends and other capital changes.

<TABLE 4 ABOUT HERE>

### 4.2. Sensitivity tests

4.2.1 Alternative estimation procedures

We report results based on pooled time-series and cross-sections with two way clustered errors using firm and year as the clustering indicators (Petersen, 2009). However, a number of different approaches have been used in existing research to estimate these models and we test the sensitivity of our results to: i) the inclusion of a scaled intercept (Akbar and Stark, 2003) ii) estimation with coefficients and standard errors derived from annual OLS estimates (Fama and MacBeth, 1973) iii) estimation with coefficients and standard errors derived from annual quantile regression estimates (Hao and Naiman, 2007) and iv) standard fixed effects and random effects panel data estimation. For these six alternative estimation procedures the dividend coefficient in our model six in table four ranges from -0.915 to 1.154, all insignificantly different from zero, and the other capital changes coefficient varies from -1.485 to -0.873 and in all cases is significantly different from zero. In no case are we able to reject dividend displacement, other capital changes displacement or the hypothesis that the coefficient on dividends and other capital changes are the same. The overall picture from these robustness tests is that our main conclusion is not sensitive to these different estimation procedures.

### 4.2.2 Stability across different sub-samples

Our results suggest that dividend displacement cannot be rejected across a broad sample of companies with positive current net income where estimates of core income and other information are incorporated into the model. This result does not necessarily imply that dividends do not have a value impact for some sections of the sample. We investigate five factors that might influence the value relevance of dividends: size (measured by market capitalization), the information environment, proxied by the number of zero-return days (Ashbaugh et al., 2006), financial leverage (Rees, 1997; and Fama and French 1998), the expected conservatism of the accounting system (Khan and Watts, 2009) and ownership concentration. We divide the sample into two equal parts according to the variable of interest and test for dividend and other capital relevance for both sub-samples and also test for equality of the estimated coefficient between the sub-samples on both dividends and other capital changes.

Using the final version of Equation 2, as reported in column five of Table 4, in none of the samples is dividend displacement rejected nor is there significant evidence that the coefficient on dividends differs from that on other capital changes. For each subsample we also test whether the value impact, the coefficient on dividends minus that on book value, is significantly different across the two segments. In one instance the value impact of other capital differs significantly between the two sub-samples. Other capital changes have an apparent net value impact of -2.35 (*p*-value 0.045) for low gearing firms and -0.86 for highly geared firms (*p*-value 0.039). The difference in the value impact of dividends comes close to being statistically significant at 5% where dividends for firms with low numbers of zero days have an estimated value of -2.20, which contrasts with 1.39 for firms with high numbers of zero days (*p*-value 0.063).

In total we have estimated both dividend and other capital displacement in ten samples and from the twenty tests in only one case, for other capital changes, was displacement rejected. We have also contrasted the value impact between two sub-samples segment on five dimensions for both dividends and other capital changes. Of the ten tests we find a significant difference (at the conventional 5% level) in only one instance. Our overall conclusion from this analysis is that dividend displacement and other capital displacement is the norm. There are some marginal indications that the value impact of dividends or other capital changes may differ between samples, but that is tentative and for future research.

We also re-estimate our model for a subset of 363 cases where the firms were excluded due to negative earnings in year t-1 but are included in the profitable sample in year t and 457 cases where we were unable to estimate **cni** in year *t*-1 but were able to include the case in year t. In this way we can gain an insight into any difference between excluded and included firms. The results for the sub-sample of firms that re-enter the sample are consistent with the results reported suggesting that there is nothing untypical in the firms excluded from the sample.

#### 4.2.3 Impact of other firm characteristics

Our focus is to re-examine the evidence from accounting based valuation models that conflicts with theories of dividend irrelevance. However, these models have also been used to test the value relevance of a variety of factors and given the unreasonable coefficients typically reported for dividends in such models we are concerned that the results of these models may be unreliable. Two examples that have received some support in earlier research are capital expenditure (Rees, 1997; and Dedman et al., 2010) and leverage (Rees, 1997; and Fama and French, 1998). These have not received the level of empirical support to justify their inclusion in the base models used in Tables 3 and 4, but we use them to test the reliability of the valuation model approach to examine the value relevance of firm characteristics. We re-estimate Equation 2 with the addition of an interest expense and capital expenditure variable. We test the model using: i) the full IBES sample ii) the sample reduced to profitable dividend payers; and iii) that sample including our estimate of core income. We then repeat these tests with the inclusion of other information.

These analyses corroborate our results for dividends: when core earnings are adequately modelled with or without other information, we cannot reject dividend displacement. The coefficients on other capital changes are reliably negative. We find that the coefficient on the interest expense is negative and insignificant when the sample includes loss-making firms but the restriction to profitable firms and the inclusion of an estimate of core earnings, with or without other information, confirms a significant negative coefficient of about twice that originally estimated. The coefficient on capital expenditure is significant and positive when the sample includes loss-making firms but is trivial and insignificantly negative whenever loss makers are excluded. These results suggest that researchers should show caution when using valuation models to test value relevance, as the conclusions are sample specific and highly dependent on model specification.

### 4.3 Testing the role of dividends as a surrogate for core earnings

We conjecture that previous models of value have tended to overstate the value relevance of dividends due to a strong relationship between dividends and core net income as was suggested in Rees (1997), Fama and French (1998) and Giner and Rees (1999). In a model where core income is important to value, yet is inadequately captured in the explanatory variables, the coefficient on dividends will tend to become inflated if it is correlated with the omitted core income variable. In Table 5 we report the results of our models of core income including all remaining explanatory variables from our valuation models. In models in columns one and three we include the full IBES sample and in models in columns two and four we restrict it to profitable dividend paying firms within the IBES sample. In models in columns five and six we also include the "other information" variable.

<TABLE 5 ABOUT HERE>

As can be seen from Table 5 our estimate of core income is robustly associated with net income, but this positive relationship is stronger when loss-making firms are excluded from the analysis. Research and development typically has a positive association with core earnings when loss-makers are excluded and a negative impact otherwise. Other capital changes have a negative impact, usually significant. The inclusion of other information has little effect on the net income coefficients but tends to reduce the dividend coefficient by approximately a third whereas the dividend coefficient remains strongly and significantly positive.

However, it is the inter-relationship between the net income and dividend coefficients that produces the main insights. Where net income is relatively weakly correlated with core income, i.e. where loss-making firms are included, dividends are strongly correlated with core income. Where net income is more strongly correlated with core income dividends are weaker. These results are consistent with dividends acting as a surrogate for core income, but that role is reduced when the other information variable is incorporated into the model or when net income itself is able to model core income i.e. when net income is positive.

### 4.4 Dividends as predictors of subsequent earnings.

In Table 6 we report the results of the earnings prediction model. Our paper is focused on the relationship between dividends and value, and we are interested to know if that relationship is driven by the correlation between current dividends and subsequent earnings. Our previous results showing that dividends help identify core income suggest, but do not prove, that dividends help predict future income. In Table 6 we report the results for the sample restricted to cases where *cni* is available. In the models in the first three columns, where both profitable and loss-making firms are included, dividends have the expected significant positive relationship with subsequent earnings. The coefficient is significantly lower when the proxy for core net income *cni* is included but is only marginally affected when other information is included. In the models in the final three columns, where loss-making firms are excluded, dividends have no significant predictive power whether or not core net income and/or other information are included or excluded. The lack of any significant explanatory power in columns five and six is as expected. For these samples dividends do not have a positive impact on value. However, the result in column four is unexpected. For this sample dividends are significant indicators of value and core income but apparently not for future income.

<TABLE 6 ABOUT HERE>

## 5. Conclusion

Using a relatively large and recent sample of publicly quoted UK firm spanning 19 years we replicate previous results that show dividends have a high positive coefficient in models of market capitalisation. However, if loss-making firms are removed from the sample or proxies of core income are included, the coefficient on dividends becomes much lower. If both constraints are imposed the dividend coefficient is insignificantly different from dividend displacement and insignificantly different from the value impact of other capital changes. If that model is supplemented by "other information", derived from the residual of a lagged valuation model as specified by Akbar and Stark (2003), the coefficient on dividends becomes negative, remains consistent with dividend displacement and insignificantly different from the coefficient on other capital changes. This result is robust to a set of alternative estimation approaches. It is also found in 10 sub-samples which are split along five dimensions which can be hypothesised as indicators of circumstances where the value impact of dividends might be expected to vary: size, leverage, information asymmetry, ownership and accounting conservatism. In none of these sub-samples can dividend displacement be rejected.

We hypothesise that prior results with a positive coefficient on dividends were driven by dividends standing in as a surrogate for core earnings and hence as an indicator of future earnings. We go on to test this explicitly and find that dividends are strongly associated with core earnings where loss-making firms are included. When the Akbar and Stark (2003) other information variable is included in the model the influence of dividends reduced by about one-third but remains highly significant. We also show that dividends contain incremental information about future earnings where the model includes loss-making firms. These results are entirely consistent with the valuation model results: dividends are important where they indicate core earnings and have less impact, and ultimately a negative impact consistent with dividend displacement, where they are weakly associated with core income.

Our conclusion that dividend displacement cannot be rejected for a large part of our sample requires that we restrict the sample to a sub-sample where we are confident in the experimental setting. This approach is rather different from many existing market-based accounting research papers. It is more common to strive for the largest sample possible. This is entirely understandable, but we seek to investigate an anomalous result and one that we clearly show is influenced by the modal specification and sample composition. In these circumstances it is important to identify those elements of the sample or characteristics of the model that lead to an apparently positive value impact from paying dividends. The sample we are left with consists of typical profitable, dividend-paying firms for which analysts' forecasts are available. These are not unusual firms. The descriptive statistics show that the full sample is similar to the I/B/E/S sample and the results for the I/B/E/S sample, excluding the I/B/E/S derived core income variable, are entirely consistent with the estimates from the broader sample. When we omit loss-making firms our results change as expected. However, these firms re-enter the sample when they become profitable or resume paying dividends and our sensitivity tests show that the results for this sub-sample are no different from the firms that remained in the sample.

Our results imply that dividend displacement is a good description of the relationship between dividends and value for typical profitable dividend paying firms. They also explain why a long list of earlier papers, including Rees (1997), Fama and French (1998), Giner and Rees (1999), Akbar and Stark (2003), and Hand and Landsman, (2005), Pinkowitz et al. (2006), Dittmar et al. (2007), Poletti Hughes (2008), Dedman et al. (2009), Gregoriou (2010) and Dedman et al. (2010) reported results where dividends appeared to have a strong positive impact on value. This instability in the relationship between dividends and value is mirrored by fluctuations in the book value and earnings coefficients and in our sensitivity tests when we investigated the value relevance of interest charges and capital expenditure. This suggests that researchers should carefully select their experimental sample and model specification when using valuation models to investigate the value relevance of accounting numbers or firm characteristics.

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**Table 1: Sample formation procedure**

| | |
|---|---|
| Initial cases | 28,968 |
| | |
| Less cases with missing values of **$mv_t$, $ni_t$, $rd_t$, $d_t$, $oc_t$** or book value of equity ≤0. | 4,037 |
| Non-missing variables for the basic model | 24,931 |
| less accounting year longer than/shorter than 1 year plus/minus 3 months | 1,533 |
| =Total number of cases before outlier deletion | 23,398 |
| less outliers on all variables simultaneously | 5,353 |
| =Total number of observations in sample | 18,045 |
| | |
| Sub-samples information: | |
| a) Profitable, dividend-paying observations | 10,417 |
| b) Valid estimates of core income available (**$cni_t$**) | 11,573 |
| c) Valid estimates of other information available (**$oi_t$**) | 14,229 |
| a+b) | 8,193 |
| a+c) | 8,827 |
| b+c) | 8,533 |
| a+b+c) | 6,525 |

**Notes.** The variables are defined as follows: **$mv_t$** is market value of equity six months after the year end, **$d_t$** is ordinary dividends, **$ni_t$** is net income, **$oc_t$** is other capital changes such as stock issues or repurchases, **$cni_t$** is our estimate of core earnings, **$oi_t$** is the estimate of other information and all variables are deflated by the closing book value of equity. The initial sample is drawn from all firms available on the Datastream database for the UK, active and dead firms, for the years 1992-2008.

**Table 2: Descriptive statistics**

**Panel 1. Full Sample**

| | $mv_t$ | $d_t$ | $oc_t$ | $ni_t$ | $rd_t$ | $oi_t$ |
|---|---|---|---|---|---|---|
| **<u>All observations</u>** | | | | | | |
| mean | 2.604 | 0.047 | -0.086 | 0.008 | 0.032 | 2.741 |
| sd | 3.092 | 0.055 | 0.235 | 0.397 | 0.085 | 1.543 |
| min | 0.145 | 0.000 | -2.458 | -5.715 | 0.000 | 0.415 |
| max | 45.026 | 0.544 | 0.224 | 1.106 | 0.777 | 10.850 |
| **<u>Profitable Dividend-Paying Sample</u>** | | | | | | |
| mean | 2.657 | 0.067 | -0.046 | 0.163 | 0.021 | 2.617 |
| sd | 2.863 | 0.054 | 0.168 | 0.118 | 0.058 | 1.233 |
| min | 0.145 | 0.000 | -2.342 | 0.000 | 0.000 | 0.417 |
| max | 41.938 | 0.544 | 0.224 | 1.076 | 0.777 | 10.255 |
| **<u>All observations – Correlation Matrix</u>** | | | | | | |
| **$mv_t$** | 1.000 | 0.262 | -0.259 | 0.415 | 0.177 | 0.209 |
| **$d_t$** | 0.222 | 1.000 | 0.083 | 0.565 | 0.043 | 0.312 |
| **$oc_t$** | -0.155 | 0.159 | 1.000 | 0.021 | -0.095 | 0.097 |
| **$ni_t$** | 0.069 | 0.292 | 0.230 | 1.000 | 0.002 | -0.015 |
| **$rd_t$** | 0.206 | -0.041 | -0.088 | -0.129 | 1.000 | 0.380 |
| **$oi_t$** | 0.222 | 0.340 | 0.080 | -0.326 | 0.404 | 1.000 |
| **<u>Profitable Dividend-Paying Sample– Correlation Matrix</u>** | | | | | | |
| **$mv_t$** | 1.000 | 0.482 | -0.283 | 0.657 | 0.195 | 0.312 |
| **$d_t$** | 0.394 | 1.000 | -0.063 | 0.527 | 0.175 | 0.594 |
| **$oc_t$** | -0.135 | 0.030 | 1.000 | -0.142 | -0.095 | 0.062 |
| **$ni_t$** | 0.591 | 0.572 | -0.079 | 1.000 | 0.122 | 0.310 |
| **$rd_t$** | 0.200 | 0.130 | 0.012 | 0.146 | 1.000 | 0.298 |
| **$oi_t$** | 0.311 | 0.615 | 0.151 | 0.378 | 0.380 | 1.000 |

**Panel 2. IBES Sample**

| | $mv_t$ | $d_t$ | $oc_t$ | $ni_t$ | $rd_t$ | $cni_t$ | $oi_t$ |
|---|---|---|---|---|---|---|---|
| **IBES Sample** | | | | | | | |
| mean | 2.730 | 0.060 | -0.054 | 0.097 | 0.034 | 0.086 | 2.717 |
| sd | 2.813 | 0.057 | 0.166 | 0.226 | 0.081 | 0.113 | 1.360 |
| min | 0.187 | 0.000 | -1.604 | -1.939 | 0.000 | -0.465 | 0.223 |
| max | 34.579 | 0.600 | 0.254 | 1.047 | 0.730 | 1.271 | 8.925 |
| **Profitable Dividend-Paying IBES Sample** | | | | | | | |
| mean | 2.805 | 0.072 | -0.042 | 0.170 | 0.023 | 0.104 | 2.718 |
| sd | 2.695 | 0.055 | 0.147 | 0.115 | 0.056 | 0.092 | 1.245 |
| min | 0.188 | 0.000 | -1.602 | 0.000 | 0.000 | -0.147 | 0.235 |
| max | 34.579 | 0.600 | 0.253 | 1.047 | 0.653 | 1.156 | 8.882 |
| **Full IBES Sample – Correlation Matrix** | | | | | | | |
| $mv_t$ | 1.000 | 0.343 | -0.261 | 0.528 | 0.166 | 0.684 | 0.327 |
| $d_t$ | 0.304 | 1.000 | 0.036 | 0.502 | 0.020 | 0.513 | 0.522 |
| $oc_t$ | -0.118 | 0.126 | 1.000 | -0.053 | -0.101 | -0.108 | 0.066 |
| $ni_t$ | 0.264 | 0.369 | 0.098 | 1.000 | -0.028 | 0.733 | 0.234 |
| $rd_t$ | 0.177 | -0.063 | -0.068 | -0.190 | 1.000 | 0.022 | 0.304 |
| $cni_t$ | 0.480 | 0.473 | 0.048 | 0.503 | -0.106 | 1.000 | 0.344 |
| $oi_t$ | 0.319 | 0.531 | 0.157 | 0.012 | 0.372 | 0.262 | 1.000 |
| **Profitable Dividend-Paying IBES Sample – Correlation Matrix** | | | | | | | |
| $mv_t$ | 1.000 | 0.465 | -0.254 | 0.647 | 0.174 | 0.782 | 0.414 |
| $d_t$ | 0.416 | 1.000 | -0.021 | 0.523 | 0.164 | 0.537 | 0.655 |
| $oc_t$ | -0.106 | 0.062 | 1.000 | -0.106 | -0.076 | -0.166 | 0.048 |
| $ni_t$ | 0.614 | 0.578 | -0.030 | 1.000 | 0.100 | 0.794 | 0.433 |
| $rd_t$ | 0.191 | 0.118 | 0.024 | 0.123 | 1.000 | 0.124 | 0.305 |
| $cni_t$ | 0.687 | 0.528 | -0.067 | 0.751 | 0.150 | 1.000 | 0.470 |
| $oi_t$ | 0.412 | 0.658 | 0.155 | 0.484 | 0.395 | 0.467 | 1.000 |

**Notes.** The variables are defined as follows: $\mathbf{mv}_t$ is the market value of common shares taken six months after the accounting year end, $d_t$ is ordinary dividends, $\mathbf{oc}_t$ is other capital changes such as issues or repurchases, $ni_t$ is net income, $\mathbf{rd}_t$ is research and development expenditure, $\mathbf{oi}_t$ is the valuation error from t-1 and $\mathbf{cni}_t$ is our estimate of the core component of earnings obtained by regressing current net income on consensus forecast of next years' earnings $\mathbf{cni}^f_{it} = \mathbf{b}_0 + \mathbf{b}_1\mathbf{fni}_{it}$ and using time *t* data to compute the estimate of $\mathbf{cni}_{it}$. All variables are deflated by current book value of equity at t. Panel 1 contains the descriptive statistics for the pooled 1992-2008 samples as defined in Table 1 and a sub-sample of profitable dividend paying firms and Panel 2 is restricted to cases where IBES forecasts are available. For the correlation matrices the product moment correlations are below the diagonal and rank correlations are above the diagonal.

**Table 3 Valuation Models Excluding Core Earnings.**

| Sample | (1) All | (2) All $ni_t$ & $d_t$ >0 | (3) IBES | (4) IBES $ni_t$ & $d_t$ >0 | (5) All | (6) All $ni_t$ & $d_t$ >0 | (7) IBES | (8) IBES $ni_t$ & $d_t$ >0 |
|---|---|---|---|---|---|---|---|---|
| $\mathbf{bv_t}$ | **1.698** | -0.0294 | **1.416** | 0.102 | **0.798** | -0.144 | **0.424** | **-0.311** |
| | (12.36) | (0.26) | (10.76) | (0.95) | (5.97) | (1.23) | (2.83) | (2.14) |
| $\mathbf{ni_t}$ | 0.228 | **13.17** | **2.349** | **12.560** | **1.159** | **12.550** | **3.281** | **12.290** |
| | (1.73) | (12.77) | (5.10) | (13.40) | (5.17) | (13.93) | (8.03) | (12.49) |
| $\mathbf{rd_t}$ | **7.581** | **5.487** | **8.213** | **5.826** | **5.136** | **4.632** | **4.638** | **3.621** |
| | (6.82) | (4.16) | (6.84) | (4.29) | (5.04) | (3.06) | (5.04) | (2.72) |
| $\mathbf{d_t}$ | **14.43** | **5.189** | **13.250** | **4.415** | **8.962** | 2.682 | **5.632** | 1.345 |
| | (10.44) | (3.93) | (9.17) | (2.80) | (7.07) | (1.80) | (4.00) | (0.95) |
| $\mathbf{oc_t}$ | **-2.328** | **-1.438** | **-2.712** | **-1.785** | **-2.845** | **-1.823** | **-3.137** | **-2.085** |
| | (12.32) | (3.99) | (8.92) | (3.87) | (9.77) | (4.65) | (7.54) | (4.27) |
| $\mathbf{oi_t}$ | | | | | **0.354** | **0.152** | **0.487** | **0.279** |
| | | | | | (6.17) | (2.41) | (6.94) | (4.30) |
| F-stats: | | | | | | | | |
| $b_4$-$b_0$=-1 | **96.62** | **21.60** | **71.92** | **11.20** | **56.09** | **6.84** | **21.07** | **3.62** |
| $b_5$-$b_0$=-1 | **179.81** | 1.37 | **92.96** | **3.93** | **86.79** | **3.24** | **40.87** | **3.26** |
| $b_4 = b_5$ | **134.44** | **23.21** | **104.23** | **12.95** | **91.53** | **9.17** | **37.27** | **5.14** |
| N | 18045 | 10417 | 11573 | 8193 | 14229 | 8827 | 8533 | 6525 |
| adj. $R^2$ | 0.115 | 0.403 | 0.187 | 0.44 | 0.147 | 0.378 | 0.224 | 0.411 |

**Notes.** The variables are defined as follows: $\mathbf{mv_t}$ is the market value of common shares taken six months after the accounting year end, $\mathbf{ni_t}$ is net income, $\mathbf{cni_t}$ is our estimate of the core component of earnings obtained by regressing current net income on consensus forecast of next years' earnings $\mathbf{cni^f_{it} = b_0 + b_1 fni_{it}}$ and using time *t* data to compute the estimate of $\mathbf{cni_{it}}$, $\mathbf{rd_t}$ is research and development, $\mathbf{d_t}$ is ordinary dividends, $\mathbf{oc_t}$ is other capital changes such as issues or repurchases. All variables are deflated by current book value of equity at t. The estimated model is:

$$\mathbf{mv_{it} = \beta_0 bv_{it} + \beta_1 ni_{it} + \beta_2 rd_{it} + \beta_3 d_{it} + \beta_4 oc_{it} + \beta_5 oi_{it} + e_{it}}$$

All regressions are pooled and standard errors are 2-way clustered by year and by firm (Petersen, 2009). Absolute values of the t-statistics are given in brackets. Coefficients or f-statistics that are statistically significant at 5% are in bold.

**Table 4 Valuation Models Including Core Earnings.**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Sample | IBES | IBES $ni_t$ & $d_t$ >0 | IBES | IBES $ni_t$ & $d_t$ >0 | IBES | IBES $ni_t$ & $d_t$ >0 | IBES | IBES $ni_t$ & $d_t$ >0 |
| Form of **cni** | forward | forward | lag | lag | forward | forward | lag | lag |
| **bv$_t$** | **1.114** | **0.206** | **0.957** | **-0.421** | **0.411** | -0.0671 | 0.165 | **-0.689** |
| | (10.92) | (2.18) | (7.72) | (2.26) | (3.28) | (0.48) | (1.16) | (4.09) |
| **ni$_t$** | 0.301 | **4.948** | **0.635** | **6.140** | **1.261** | **4.908** | **1.415** | **6.374** |
| | (0.95) | (5.82) | (2.35) | (7.57) | (4.19) | (5.88) | (5.04) | (7.88) |
| **cni$_t$** | **10.700** | **14.54** | **5.730** | **10.903** | **10.030** | **14.240** | **5.624** | **10.066** |
| | (10.82) | (10.00) | (7.01) | (6.91) | (8.61) | (9.56) | (7.11) | (6.83) |
| **rd$_t$** | **8.271** | **4.468** | **8.574** | **5.104** | **5.780** | **3.048** | **5.528** | **3.235** |
| | (7.22) | (3.32) | (6.25) | (3.32) | (5.63) | (2.34) | (5.64) | (2.54) |
| **d$_t$** | **5.757** | 0.843 | **8.427** | 1.803 | 0.939 | -0.926 | 1.979 | -0.893 |
| | (4.72) | (0.62) | (6.61) | (1.28) | (0.74) | (0.62) | (1.64) | (0.62) |
| **oc$_t$** | **-2.590** | **-1.226** | **-3.026** | **-1.644** | **-2.770** | **-1.480** | **-3.145** | **-1.673** |
| | (8.22) | (2.99) | (6.37) | (3.51) | (6.37) | (3.52) | (6.87) | (3.70) |
| **oi$_t$** | | | | | **0.345** | **0.182** | **0.429** | **0.221** |
| | | | | | (5.73) | (2.95) | (6.53) | (2.99) |
| F-stats: | | | | | | | | |
| $b_4$-$b_0$=-1 | **20.04** | 1.45 | **41.23** | **5.62** | 1.46 | 0.01 | **5.95** | 0.34 |
| $b_5$-$b_0$=-1 | **69.77** | 1.25 | **33.74** | 0.21 | **28.75** | 1.47 | **26.28** | 0.00 |
| $b_4 = b_5$ | **40.40** | 2.13 | **69.47** | **5.01** | **7.82** | 0.13 | **16.12** | 0.30 |
| N | 11573 | 8193 | 8839 | 6686 | 8533 | 6525 | 8312 | 6408 |
| adj. R2 | 0.302 | 0.531 | 0.222 | 0.459 | 0.327 | 0.509 | 0.247 | 0.445 |

**Notes.** The variables are defined as follows: **mv$_t$** is the market value of common shares taken six months after the accounting year end, **ni$_t$** is net income, **rd$_t$** is research and development, **d$_t$** is ordinary dividends, **oc$_t$** is other capital changes such as issues or repurchases, **oi$_t$** is the valuation error from t-1 and **cni$_t$** is our estimate of the core component of earnings obtained in either of the two ways: (i) by regressing current net income on consensus forecast of next years' earnings $\mathbf{cni^f_{it} = b_0 + b_1 fni_{it}}$ and using time *t* data to compute the estimate of $\mathbf{cni_{it}}$ or (ii) by regressing this year's net income $\mathbf{ni_{it}}$ on the prior forecast of this year's net income $\mathbf{fni_{it-1}}$ combined with the IBES-actual definition of this year's base earnings $\mathbf{fy0_i}$ $\mathbf{cni^l_{it} = c_0 + c_1 fy0_{it} + c_2 fni_{it-1}}$ and using time *t* data to compute the estimate of $\mathbf{cni_{it}}$ where $\mathbf{fy0_{it}}$ is the IBES definition of base (FY0) earnings at time t and $\mathbf{fni_{t-1}}$ is the expectation (analysts' mean forecast) at time t-1 of net income at t. All variables are deflated by current book value of equity **bv$_t$**. The estimated models are of the following form:

$$\mathbf{mv}_{it} = \gamma_0\mathbf{bv}_{it} + \gamma_1\mathbf{ni}_{it} + \gamma_2\mathbf{rd}_{it} + \gamma_3\mathbf{d}_{it} + \gamma_4\mathbf{oc}_{it} + \gamma_5\mathbf{oi}_{it} + \gamma_6\mathbf{cni}_{it} + \mathbf{e}_{it}$$

All variables are deflated by current book value of equity $\mathbf{bv}_t$. All regressions are pooled and standard errors are 2-way clustered by year and by firm (Petersen, 2009). Absolute values of the t-statistics are given in brackets. Coefficients or f-statistics that are statistically significant at 5% are in bold.

**Table 5. Models of Core Earnings**
**(based on forecasts at time t of t+1 net income)**

| | (1) IBES | (2) IBES $ni_t$ & $d_t$ >0 | (3) IBES | (4) IBES $ni_t$ & $d_t$ >0 | (5) IBES | (6) IBES $ni_t$ & $d_t$ >0 |
|---|---|---|---|---|---|---|
| $bv_t$ *(const.)* | **0.0283** | **-0.00711** | **0.0265** | -0.00705 | 0.00131 | **-0.0171** |
| | (6.09) | (2.16) | (5.57) | (1.87) | (0.21) | (4.06) |
| $ni_t$ | **0.191** | **0.524** | **0.189** | **0.529** | **0.201** | **0.519** |
| | (10.72) | (24.68) | (8.64) | (19.06) | (8.68) | (18.52) |
| $rd_t$ | -0.00546 | **0.0934** | -0.0205 | **0.0872** | **-0.114** | 0.0403 |
| | (0.19) | (3.70) | (0.59) | (2.44) | (3.49) | (1.08) |
| $d_t$ | **0.700** | **0.246** | **0.671** | **0.242** | **0.468** | **0.160** |
| | (15.36) | (5.75) | (11.56) | (4.65) | (7.13) | (3.00) |
| $oc_t$ | -0.0114 | **-0.0385** | -0.0223 | **-0.0356** | **-0.0366** | **-0.0425** |
| | (1.05) | (5.53) | (1.62) | (3.89) | (2.79) | (4.80) |
| $oi_t$ | | | | | **0.0142** | **0.00681** |
| | | | | | (6.57) | (4.64) |
| N | 11573 | 8193 | 8533 | 6525 | 8533 | 6525 |
| adj. R-sq | 0.355 | 0.631 | 0.349 | 0.583 | 0.365 | 0.586 |

**Notes.** The variables are defined as follows: $\mathbf{cni_t}$ is our estimate of the core component of earnings obtained by regressing current net income on consensus forecast of next years' earnings $\mathbf{cni^f_{it} = b_0 + b_1 fni_{it}}$ and using time t data to compute the estimate of $\mathbf{cni_{it}}$, $\mathbf{ni_t}$ is net income, $\mathbf{rd_t}$ is research and development, $\mathbf{d_t}$ is ordinary dividends, $\mathbf{oc_t}$ is other capital changes such as issues or repurchases and $\mathbf{oi_t}$ is the valuation error from t-1. All variables are deflated by current book value of equity at t. The estimated models are of the following form:

$$\mathbf{cni_{it} = \delta_0 bv_{it} + \delta_1 ni_{it} + \delta_2 rd_{it} + \delta_3 d_{it} + \delta_4 oc_{it} + \delta_5 oi_{it} + e_{it}}$$

All regressions are pooled and standard errors are 2-way clustered by year and by firm (Petersen, 2009). Absolute values of the t-statistics are given in brackets. Coefficients that are statistically significant at 5% are in bold.

**Table 6. Models of t+1 Earnings**

| | (1) IBES | (2) IBES | (3) IBES | (4) IBES $ni_t$ & $d_t$ >0 | (5) IBES $ni_t$ & $d_t$ >0 | (6) IBES $ni_t$ & $d_t$ >0 |
|---|---|---|---|---|---|---|
| $bv_t$ *(const.)* | 0.00720 | -0.0134 | 0.000565 | **-0.0172** | **-0.0124** | **-0.00224** |
| | (0.79) | (1.60) | (0.06) | **(2.96)** | **(2.03)** | **(0.23)** |
| $ni_t$ | **0.549** | **0.402** | **0.392** | **0.987** | **0.632** | **0.638** |
| | **(14.31)** | **(10.79)** | **(10.73)** | **(23.42)** | **(9.02)** | **(9.13)** |
| $cni_t$ | | **0.778** | **0.791** | | **0.670** | **0.679** |
| | | **(12.71)** | **(13.29)** | | **(6.38)** | **(6.43)** |
| $rd_t$ | -0.0925 | -0.0765 | -0.0231 | -0.00875 | -0.0672 | -0.0207 |
| | (1.70) | (1.51) | (0.36) | (0.17) | (1.17) | (0.35) |
| $d_t$ | **0.756** | **0.234** | **0.340** | 0.0440 | -0.118 | -0.0373 |
| | **(9.05)** | **(3.35)** | **(2.83)** | (0.59) | (1.35) | (0.31) |
| $oc_t$ | 0.0278 | **0.0451** | **0.0535** | -0.0205 | 0.00338 | 0.0106 |
| | (0.97) | **(2.12)** | **(2.25)** | (0.72) | (0.12) | (0.35) |
| $oi_t$ | | | -0.00809 | | | -0.00687 |
| | | | (1.52) | | | (1.42) |
| N | 8533 | 8533 | 8533 | 6525 | 6525 | 6525 |
| R-sq | 0.307 | 0.378 | 0.379 | 0.293 | 0.328 | 0.329 |

**Notes.** The variables are defined as follows: $\mathbf{cni_t}$ is our estimate of the core component of earnings obtained by regressing current net income on consensus forecast of next years' earnings $\mathbf{cni^f_{it} = b_0 + b_1 fni_{it}}$ and using time t data to compute the estimate of $\mathbf{cni_{it}}$, $\mathbf{ni_t}$ is net income, $\mathbf{rd_t}$ is research and development, $\mathbf{d_t}$ is ordinary dividends, $\mathbf{oc_t}$ is other capital changes such as issues or repurchases and $\mathbf{oi_t}$ is the valuation error from *t*-1. All variables are deflated by current book value of equity $\mathbf{bv_t}$. The estimated models are of the following form:

$$\mathbf{ni_{it+1} = \phi_0 bv_{it} + \phi_1 ni_{it} + \phi_2 rd_{it} + \phi_3 d_{it} + \phi_4 oc_{it} + \phi_5 oi_{it} + \phi_6 cni_{it} + e_{it}}$$

All variables are deflated by current book value of equity at t. All regressions are pooled and standard errors are 2-way clustered by year and by firm (Petersen, 2009). Absolute values of the t-statistics are given in brackets. Coefficients that are statistically significant at 5% are in bold.

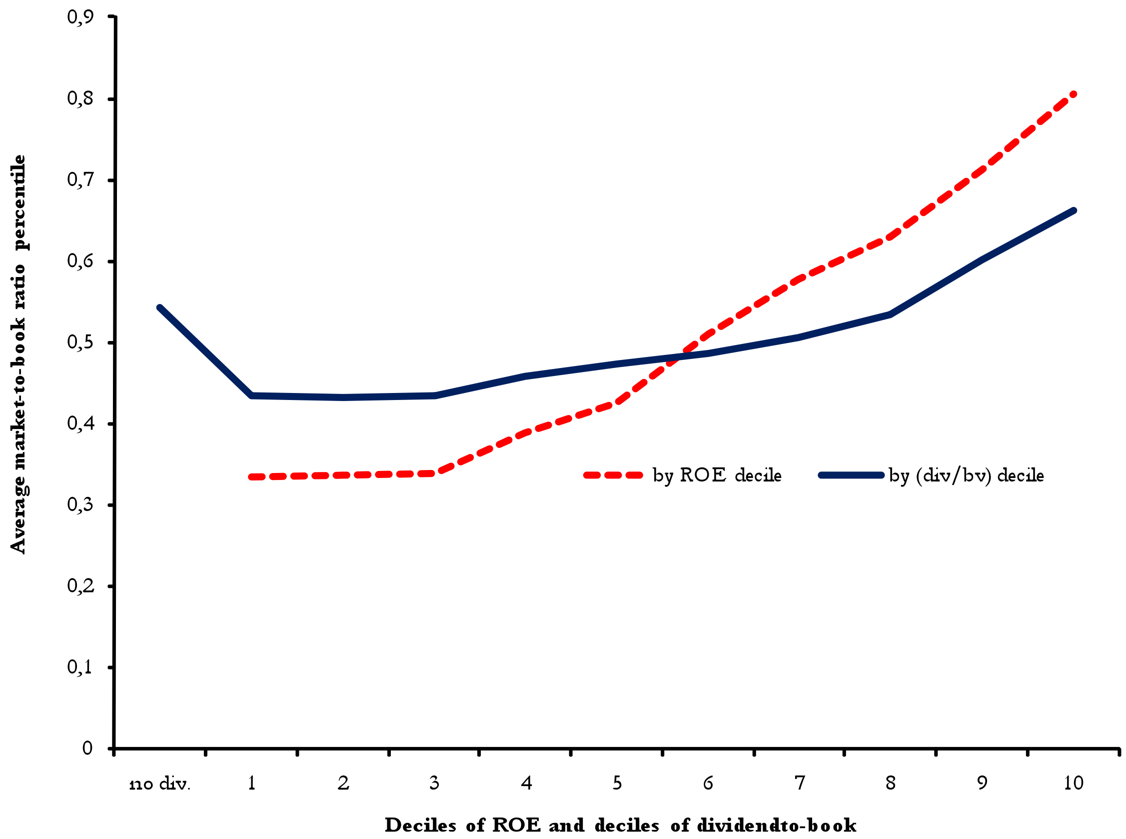


**Figure 1. Market-to-Book Percentile by Return-on-Equity Decile and Dividends-to-Book Decile**

The chart shows the average market-to-book ($mv_t$) percentile for each decile of return-on-equity ($ni_t$) and decile of dividends-to-book ($d_t$), plus a zero category for firms not paying dividends. The variables are calculated across the full sample of 18,045 cases and the percentile score is not weighted but is a simple average of the 10 (or 11 in the case of dividends-to-book ratio) categories, thereby ensuring that each percentile score is comparable with the next.